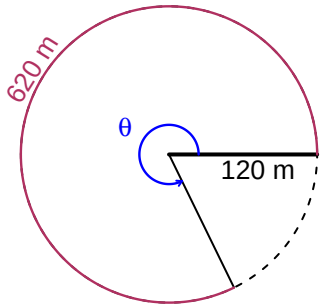
Name: Date:

Trig Final (SLTN v613)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 120 meters. The arc length is 620 meters. What is the angle measure in radians?

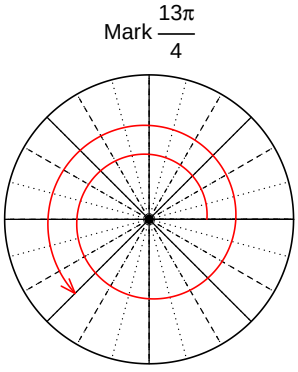


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

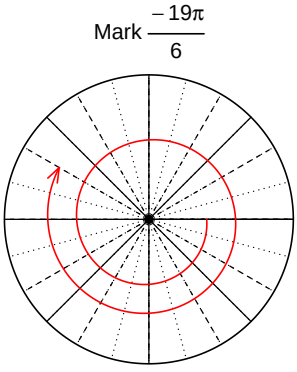
$\theta = 5.167$ radians.

Question 2

Consider angles $\frac{13\pi}{4}$ and $\frac{-19\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{13\pi}{4}\right)$ and $\sin\left(\frac{-19\pi}{6}\right)$ by using a unit circle (provided separately).



Find cos(13π/4)



Find sin(−19π/6)

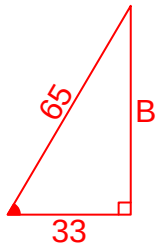
$\cos(13\pi/4) = \frac{-\sqrt{2}}{2}$

$\sin(-19\pi/6) = \frac{1}{2}$

Question 3

If $\cos(\theta) = \frac{33}{65}$, and θ is in quadrant IV, determine an exact value for $\tan(\theta)$.

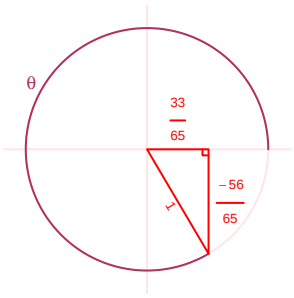
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$33^2 + B^2 = 65^2$$
$$B = \sqrt{65^2 - 33^2}$$
$$B = 56$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\tan(\theta) = \frac{\frac{-56}{65}}{\frac{33}{65}} = \frac{-56}{33}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 6.05$ meters, an amplitude of 2.56 meters, and a frequency of 8.54 Hz. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -2.56\cos(2\pi 8.54t) + 6.05$$

or

$$y = -2.56\cos(17.08\pi t) + 6.05$$

or

$$y = -2.56\cos(53.66t) + 6.05$$